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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 7] [1921

XXXI.—REVISION OF THE GENUS TRYPHOSTEMMA.

J. Hutchinson and K. Pearce.

For some time past it has been found difficult to determine specimens of the African genus *Tryphostemma* (*Passifloraceae*), owing to the large number of described species since the publication of the second volume of the Flora of Tropical Africa. In that work the genus was represented by a single species, *Tryphostemma zanzibaricum*, Mast., besides two species of *Basananthe*, Peyr., now considered synonymous. The present paper presents a working key and an enumeration of the known species of the genus, although the material of several of them is still far from adequate. The specimens preserved in the Kew Herbarium and the Natural History Museum, South Kensington, are included, and our thanks are due to Dr. A. B. Rendle for allowing us to examine those under his charge, and to Mr. E. G. Baker for supplying the description of *T. reticulatum*.

The genus *Tryphostemma* was founded by Harvey* for a Natal plant, *T. Sandersonii*, a species without petals. In 1871, Masters† added a second species from Zanzibar, *T. zanzibaricum*, also without petals. Subsequently several species have been described in which well developed petals are present, and Engler in 1892 pointed out the desirability of including *Basananthe*, Peyr. He divided the genus into three sections, I. *Eutryphostemma*, petals absent and the outer part of the corona with one series of fimbrillae; II. *Neotryphostemma*, petals present, and the corona as in the preceding section; and III. *Basananthe*, petals present, outer part of corona with one series of fimbrillae and one series of small inflexed teeth. Although these features may be constant, they are not readily ascertainable from dried specimens, and we have consequently employed other and more obvious characters, based on the leaves and stipules, from which a natural classification seems to result.

* Harv. Thes. Cap. i. t. 51 (1859).
† Fl. Trop. Afr. ii. 508.

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The following is a summary of the distribution of the species, which are apparently quite local :—

Angola, *T. littorale*, *T. Baumii*, *T. reticulatum*, *T. Gossweileri*. South West Africa, *T. heterophyllum*. Eastern Soudan, *T. niloticum*. Uganda, *T. Hanningtonianum*. Kenya Colony, *T. Snowdenii*. Tanganyika Territory, *T. Hanningtonianum*, *T. Volkensii*, *T. zanzibaricum*, *T. lanceolatum*, *T. longifolium*, *T. Stuhlmannii*, *T. pilosum*. Nyasaland, *T. apetalum*. Rhodesia, *T. pedatum*, *T. apetalum*, *T. parvifolium*. Portuguese East Africa, *T. trilobum*, *T. Schinzianum*. Transvaal, *T. Schlechteri*, *T. sagittatum*, *T. viride*. Natal, *T. polygaloides*, *T. Sandersonii*, *T. nummularium*.

Series I. **Lobatifoliae**. Leaves 3–5 lobed.

Stipules filiform :

Inflorescence not tendriliform; stems short and simple :

Leaf lobes 3–5, linear or lanceolate, serrate; petiole very short; flowers about 5 mm. long - - - - - 1. *Schlechteri*.

Leaf lobes 3, oblanceolate, entire or obscurely toothed near the base; petiole 2–2·5 cm. long; flowers 1 cm. long - - 2. *heterophyllum*.

Inflorescence ending in a tendril :

Leaves 3- or rarely imperfectly 4–5-lobed; petiole about 2 cm. or more :

Mature leaves glabrous or nearly so; flower buds oblong - - - - 3. *Hanningtonianum*.

Mature leaves strigose-pubescent below; flower buds globose :

Branches glabrous; petiole about 2·5 cm. long - 4. *Volkensii*.

Branches rather densely pilose; petiole about 0·5 cm. long - - 5. *niloticum*.

Leaves 5-lobed, densely strigose-tomentose below; petiole less than 1 cm. long; flower buds oblong-ellipsoid - - 6. *Snowdenii*.

Stipules large and foliaceous :

Leaves 3-lobed; segments more or less ovate :

Leaves subsessile; lobes almost equal, more or less rounded, sharply and irregularly serrate - - - - - 7. *trilobum*.

Leaves petiolate; terminal lobe much longer than the lateral, more or less triangular :
Leaves doubly sharply serrate; petioles about 5 mm. long; Transvaal - - - 8. *sagittatum.*
Leaves simply serrate; petiole about 2 cm. long; Portuguese E. Africa - - 9. *Schinzianum.*
Leaves imperfectly 5-lobed; segments linear-lanceolate - - 10. *pedatum.*

Series II. **Integrifoliae.** Leaves not lobed or rarely slightly bilobed.
Stipules large or foliaceous; if small then fimbriate :
Stipules 1·5 cm. long or more, lanceolate ; inflorescence always terminating in a tendril - 11. *apetalum.*
Stipules much less than 1 cm., becoming fimbriate ; inflorescence rarely terminating in a tendril;
Stems branched from near the base, laxly leafy; petiole not glandular - - - 12. *polygaloides.*
Stems simple, densely leafy; petiole with stalked glands - 13. *littorale.*
Stipules filiform or minute, always entire and never foliaceous :
Climbers, peduncles always terminating in a tendril :
Leaves glabrous :
Petioles 1–1·3 cm. long; leaves never more than about 6 cm. long, and always over 1 cm. broad :
Leaves rounded at the base; petioles about 1 cm. long not winged - - - 14. *zanzibaricum.*
Leaves cuneate at the base; petioles about 1·3 cm. long frequently winged on one or both sides - 15. *lanceolatum.*
Petioles very short or nothing :
Leaves up to 15 cm. long and 1·2 cm. broad - - 16. *longifolium.*
Leaves 3–3·7 cm. long, 1·2–1·6 cm. broad; petiole rarely exceeding 8 mm. 17. *Stuhlmannii.*

Under surface of ovate leaves pilose, up to 6 cm. long and 2·7 cm. broad - - - 18. *pilosum.*

Erect herbs with short stems; peduncles very rarely terminating in a tendril:

*Leaves linear-lanceolate to ovate or obovate:

Leaves entire, strongly reticulate below:

Leaves obovate, about 6–15 cm. long and 3 cm. broad, decurrent on the petiole - - - - 19. *Baumii.*

Leaves ovate, hairy below, not decurrent on the petiole - - - 20. *reticulatum.*

Leaves toothed, at least in the lower part:

Leaves linear-lanceolate to ovate-lanceolate, only toothed in the lower part, more or less penni-nerved, about 6 cm. long:

Leaves ovate or ovate-lanceolate, averaging about 3 cm. broad, Natal - - - 21. *Sandersonii.*

Leaves lanceolate or linear-lanceolate, averaging about 1 cm. broad, Transvaal - - - 22. *viride.*

Leaves ovate - rhomboid, minutely denticulate all round, dark green, prominently 5-nerved from the base, about 3 cm. long - - - - 23. *Gossweileri.*

**Leaves reniform or orbicular, cordate, about 1 cm. long:

Leaves longer than broad, with undulate margins, mucronate - - - 24. *parvifolium.*

Leaves broader than long, shortly bilobed at the apex, about 1·5 cm. broad, serrate - - 25. *nummularium.*

1. **T. Schlechteri,** *Schinz* in Vierteljahrsschr. Nat. Ges. Zurich, lv. 243 (1910).

South Africa. Transvaal: sandy places near the Sand river, 880 m., fl. & fr. Mar. 1894, *Schlechter* 4596. Warmbaths, in open field, Jan. 1909, *Leendertz* 2062!

2. **T. heterophyllum,** *Engl.* in Bot. Jahrb. xiv. 388 (1891).—*Basananthe heterophylla,* Schinz in Verh. Bot. Ver. Brand, xxx. 252 (1888).

South Africa. South West Africa: Amboland, *Schinz* 435!

3. **T. Hanningtonianum,** *Mast.* in Hook. Ic. Pl. t. 1484 (1885); Engl. Bot. Jahrb. xiv. 390 (1891); Engl. Pflanzenw. Ost-Afr. C. 280 (1895).

Tropical Africa.—Tanganyika Territory: Kibwesi; 1000 m. in grass lands, Dec. 1905, *Scheffler* 15! in grass on borders of forests, May 1910, *Scheffler* 515! Marangu, 615 m. *H. H. Johnston*! Mainland west of Zanzibar, *Last*! Kwa-chirossa, *Hannington*! Derema, Jan. 1893, *Volkens* 117! Uganda: Kiwala, rare, Jan. 1917, 1250 m., *Dummer* 3047! (a slightly hairy form).

4. **T. Volkensii,** *Harms* in Engl. Bot. Jahrb. xix. Beibl. n. 47, 40 (1894), et in Engl. Pflanzenw. Ost. Afr. C. 281 (1895).

Tropical Africa. Tanganyika Territory: forest above Marangu; 2000 m., June 1894, *Volkens* 2339! Marangu, 2000 m., Dec. 1893, *Volkens* 1485!

5. **T. niloticum,** *Engl.* Bot. Jahrb. xiv. 389 (1891), et in Pflanzenw. Ost. Afr. C. 281 (1895).

Tropical Africa. Eastern Soudan: between Fort Fatiko and Ismailia, *S. S. W. Baker* 214!

6. **Tryphostemma Snowdenii,** *Hutchinson et Pearce,* sp. nov. *Herba* procumbens, ramosa, ramis costatis junioribus parce pubescentibus. *Folia* palmate quinqueloba, circiter 3·5 cm. longa, supra pilis paucis albidis instructa, infra dense strigoso-tomentosa, lobis obovatis acutis, marginibus stipitato-glandulosis; petioli vix 1 cm. longi, pubescentes; stipulae minutae, filiformes. *Inflorescentia* axillaris, pedunculo 3–4 cm. longo bifloro in cirrhum convolutum exeunte; pedicelli graciles, circiter 7 mm. longi, bracteis minutis filiformibus. *Flores* albi, circiter 7 mm. longi. *Sepala* lanceolato-ovata, basi lata, apice rotundata. *Petala* oblanceolato-spathulata, quam sepala angustiora. *Corona* exterior cupuliformis dentibus biseriatis, intermedia crassa disciformis, interior cupuliformis staminorum basibus circumdata. *Antherae* 1·5 mm. longae. *Ovarium* glabrum, stylis 3 brevissimis stigmatibus capitatis. *Capsula* viridis, ellipsoidea, utrinque angustata, circiter 2 cm. longa. (*See* text figure.)

Tropical Africa. Kenya Colony: Limuru; 2150 m., in short grass land, June 1918, *Snowden* 598!

7. **T. trilobum,** *Bolus* ex Schinz in Engl. Bot. Jahrb. xv. Beibl. n. 33. 2 (1892) in obs. et in Hook. Ic. Pl. t. 1838.

Fig. 1. *Tryphostemma Snowdenii*, sp. nov. (nat. size).
1 sepal, 2. petal, 3. flower with perianth removed, showing the outer fimbriate corona, 4. disc and inner corona, with stamens; 5. pistil, 6. fruit—except No. 6, enlarged.

South Africa. Portuguese East Africa: Guzeen's Kraal; 62 m., amongst bushes, Aug. 1886, *Bolus* 1157! Puzin's Kraal, 62 m., amongst bushes, Aug. 1886, *Bolus* 7606! Magaia, 15 m. Jan. 1898, *Schlechter* 12052!

8. **Tryphostemma sagittatum,** *Hutchinson et Pearce*, sp. nov. *Herba* procumbens, leviter ramosa, ramis costatis glabris. *Folia* triloba, sagittata, circiter 4 cm. longa, glabra, lobo medio lateralibus multo majore triangulari-lanceolato, marginibus profunde et acute serratis; petioli circiter 5 mm. longi; stipulae foliaceae, basi appendiculatae, usque ad 1·5 cm. longae, serratae. *Inflorescentia* axillaris, pedunculo 2–3 cm. longo

bifloro in cirrhum convolutum exeunte; pedicelli circiter 8 mm. longi, bracteis filiformibus. *Flores* pallide virides, circiter 4 mm. longi. *Sepala* ovata, basi lata, apice rotundata. *Petala* obovata, quam sepala angustiora. *Corona*, antherae, et pistillum ut in *T. Snowdenii*.

South Africa. Transvaal: Barberton; 930 m. 1889, *E. E. Galpin* 505! 893 m. Jan. 1889, *J. M. Wood* 47! Komati Poort, Jan. 1902, *J. W. Kirk* 74!

9. **T. Schinzianum,** *Harms* in Engl. et Prantl. Natürl. Pfl. iii. 6. A (1894) et in Engl. Pflanzenw. Ost. Afr. C. 281 (1895).

Tropical Africa. Portuguese E. Africa: Dondo near Beira; in the swamps, Dec. 1899, *Honble. Mrs. E. Cecil*, 250! Kurumadzi R., Gihu, 620 m. Nov. 1906, *C. F. M. Swynnerton* 2089! Mossurizi, 930 m. Feb. 1907, *W. H. Johnson* 145!

10. **T. pedatum,** *Baker f.* in Journ. Bot. xxxvii. 436 (1899).

Tropical Africa. Rhodesia: near the Shashi River; Jan. 1898, *Rand* 67!

11. **T. apetalum,** *E. G. Baker.* in Trans. Linn. Soc. Ser. II. iv. 14 (1894) et in Engl. Pflanzenw. Ost. Afr. C. 280 (1895).

Tropical Africa. Nyasaland: Mt. Zomba; Sept. & Oct. 1891, *A. Whyte*! 1540 m., Dec. 1896, *A. Whyte*! Zomba and vicinity, 930 m., Dec. 1896, *A. Whyte*! Shire Highlands, Milanje, Dec. 1893, *C. F. Scott-Elliot* 8661! 1891, *J. Buchanan* 1063! Rhodesia: Odanzi River Valley, 1915, *A. J. Teague* 477! Between Salisbury and Macheke, 1230 m. Sept. 1911, *Rev. F. A. Rogers* 4022! Salisbury, Dec. 1894, *Marshall*! The Commonage, Salisbury, Nov. 1908, *Rand* 470! 1347! Mazoe, 1500 m. Nov. 1906, *Eyles* 461! 412! Victoria, *Munro* 1548!

12. **Tryphostemma polygaloides,** *Hutchinson et Pearce*, sp. nov.

Caulis erectus, fere e basi ramosus, pallide stramineus, glaber, ramis gracilibus laxe foliatis obtuse costatis. *Folia* simplicia, inferiora ovata, circiter 5 cm. longa et 3 cm. lata, superiora oblongo-lanceolata, basi angustata, apice setoso-acuminata, circiter 4 cm. longa, 1·5 cm. lata, dupliciter serrata, utrinque glabra; petioli 2–5 mm. longi; stipulae minimae, foliaceae, serratae, superioribus fimbriatis. *Inflorescentia* axillaris, pedunculo circiter 3·5 cm. longo 1–2-floro non in cirrhum exeunte; pedicelli circiter 1 cm. longi, bracteis filiformibus. *Flores* lactei, circiter 8 mm. longi. *Sepala* ovata, basi lata, apice rotundata. *Petala* obovata, quam sepala angustiora. *Corona*, antherae et pistillum ut in *T. Snowdenii*.

South Africa. Natal: Umlalazi; 15 m. Mar. 1907, *Medley Wood* 10339!

13. **T. littorale,** *Engl.* Bot. Jahrb. xiv. 388 (1891) in obs.

Basananthe littoralis, Peyr. in Bot. Zeit. xvii. 101 (1859); et in Sitz. Acad. Wien, Math. Nat. xxxviii. 569 (1860); Hiern in Cat. Afr. Pl. Welw. i. 382 (1898).

Tropical Africa. Angola: Benguella; maritime thickets between Benguella and the River Catumbella, flowers and fruits

June, *Welwitsch* 872 ! biennial 5 ft., fls. whitish green, in primary thickets rather rare at Bimbas, 25 km. from Benguella, 4 July 1905, *Gossweiler* 1800 ! Lengue, Benguella, Aug. 1910, *Gossweiler*, 4946 !

14. **T. zanzibaricum,** *Mast.* in Oliv. Fl. Trop. Afr. ii. 508 (1871); et in Trans. Linn. Soc. xxvii. 639 (1870); Engl. Bot. Jahrb. xiv. 388 (1891).

Tropical Africa. Tanganyika Territory: Dar es Salaam; March 1868, *Kirk* !

15. **T. lanceolatum,** *Engl.* Bot. Jahrb. xiv. 388 (1891), et in Pflanzenw. Ost. Afr. C. 281 (1895).

Tropical Africa. Tanganyika Territory: Duga; cultivated land, July 1893, *Engler* 3168 ! East shore of Lake Tanganyika, Oct. 1893, *C. F. Scott-Elliot* 8248 ! Mombasa, Feb. 1902, *Kassner* 46 ! Steppes below Schire, 1000 m., Mar. 1894, *Volkens* 2033 !

16. **T. longifolium,** *Harms* in Engl. Bot. Jahrb. xxxiii. 149 (1904).

Tropical Africa. Tanganyika Territory: Mbarangandu territory; on sandy ground, in sunny places in the Brachystegia forest. Flowers in Dec. *Busse* 673 !

17. **T. Stuhlmannii,** *Harms* in Engl. Pflanzenw. Ost. Afr. C. 280 (1895).

Tropical Africa. Tanganyika Territory: "Zanzibar Coast"; Kisserawe, *Stuhlmann* 6243.

18. **T. pilosum,** *Harms* in Engl. Pflanzenw. Ost. Afr. C. 280 (1895).

Tropical Africa. Tanganyika Territory: "Zanzibar Coast"; Vikindo, *Stuhlmann* 6127.

19. **T. Baumii,** *Harms* in Warb. Kunene-Sambesi Exped. 310 (1903).

Tropical Africa. Angola: On the right bank of the Kubango River below Kueio; 1120 m. on sandy ground, flowers in Nov., July 1899, *Baum* 391 ! Near the fort Princeza Amelia, Kubango, Dec. 1906, *Gossweiler* 4158 !

20. **Tryphostemma reticulatum,** *Baker f.*, sp. nov.

Perennis. *Caulis* flexuosus, pubescens. *Folia* alterna, simplicia, ovata vel oblongo-ovata, apice obtusa vel leviter emarginata, basi rotundata vel leviter subcordata, margine integra subcoriacea, superne demum glabra subtus pubescentia, nervis lateralibus utrinque 5–6; lamina 3·5–4·5 cm. longa, 2–2·8 cm. lata, petiolo pubescente 3–8 mm. longo suffulta; stipulae subulatae. *Pedunculi* axillares, saepe biflori. *Calycis tubus* brevissimus; lobi lineari-oblongi, longitudinaliter striati, extus pilis vestiti. *Petala* oblanceolata, membranacea. *Corona* fimbriata. *Capsula* coriacea, extus pubescens, plus minusve 1·5 cm. longa.

Tropical Africa. Angola: along the marshes of Cambambe; in sandy ground, Nov. 1906, *Gossweiler* 3522 (Hb. Mus. Brit.) !

21. **T. Sandersonii,** *Harv.* in Thes. Cap. i. 33 (1859); Harv. & Sond. Fl. Cap. ii. 499 (1861); Mast. in Trans. Linn. Soc. xxvii. 639 (1870).

South Africa. Natal: Durban, *Sanderson* 1864 ! *Gueinzius* ! Inanda, in stony grassy places, *J. M. Wood* 180 !; June 1879, *J. M. Wood* 269 ! Near Krantz Kloof, 500 m., in grass, *R. Schlechter* 3193 ! Natal, *Sanderson* 440 ! *Gerrard* 142 ! 1821 !

22. **Tryphostemma viride,** *Hutchinson et Pearce*, sp. nov.

Caulis erectus, e rhizomate ramoso ortus, ramosus vel subsimplex, glaber, pallide stramineus, canaliculatus. *Folia* subsessilia, lanceolata vel lineari-lanceolata, basi obtusa, apice acuta, 4–8 cm. longa, 0·8–1·5 cm. lata, in dimidio inferiore tantum distanter denticulata utrinque glabra, costa et nervis lateralibus ascendentibus infra prominentibus; stipulae minutae et filiformes. *Inflorescentia* axillaris, pedunculo gracile 2-floro 2–3 cm. longo interdum in cirrhum filiformem exeunte; pedicelli circiter 5 mm. longi, bracteis minutis. *Flores* 5 mm. longi. *Sepala* obovata, obtusa. *Petala* nulla. *Corona* tripartita, exterior cupuliformis margine fimbriata et dentibus inflexis, intermedia disciformis, interior cupuliformis staminorum basibus circumdata. *Filamenta* satis lata et membranacea, apice angustata; antherae vix 1 mm. longae. *Ovarium* glabrum, stylis 3, stigmatibus capitatis. *Capsula* ovoidea, circiter 1·5 cm. longa et 8 mm. lata.

South Africa. Transvaal: Barberton; 923 m., stony hillside, Sept., *H. Bolus* 7602 ! 930 m., Apr., *E. E. Galpin* 93 ! Rimers Creek, near Barberton, 923 m., Dec., *Thorncroft* in *Herb. Medley Wood* 4366 !

23. **Tryphostemma Gossweileri,** *Hutchinson et Pearce*, sp. nov.

Caules numerosi, simplices, e rhizomate lignoso polycephalo orti, laxe foliati, pallide straminei, glabri, canaliculati. *Folia* sessilia, ovato-rhomboidea, basi rotundata, apice abrupte acuta, 3 cm. longa, 2 cm. lata, marginibus cartilagineis minute denticulatis, e basi prominenter 5-nervia, utrinque glabra; stipulae minutae et filiformes. *Inflorescentia* folia leviter excedens, pedunculo 3-floro gracile; pedicelli circiter 0·5 cm. longi, bracteis minutis. *Flores* circiter 3 mm. longi. *Sepala* elliptica apice obtusa, trinervia, glabra. *Petala* quam sepala angustiora. *Corona* duplex, exterior fimbriata, quam petala dimidio brevior, interior cupuliformis filamentis circumdata. *Stamina* et pistillum ut in *R. Snowdenii*.

Tropical Africa. Angola: here and there in the T'Chana of River Kuiriri; near Kassuango, Sept., 1906, *Gossweiler* 4068 !

24. **T. parvifolium,** *E. G. Baker* in Journ. Linn. Soc. Bot. xl. 73 (1911).

South Africa. Rhodesia: hills between Lusitu and Melsetter, 1900 m., fl. Sept. 1906, *Swynnerton* 1415 !

25. **T. nummularium**, *Engl.* in Bot. Jahrb. xiv. 388 (1891). *Basananthe nummularia*, Welw. in Trans. Linn. Soc. xxvii. 28, t. 9. (1869); Hiern in Cat. Afr. Pl. Welw. i. 382 (1898).

Tropical Africa. Angola: Huilla; moist sandy thickets about Lopollo, about 1660 m., fl. and fr. Jan.–Feb., *Welwitsch* 871!

XXXII.—N. W. HIMALAYAN ASTRAGALI OF THE SUBGENUS AEGACANTHA.

R. N. Parker.

There are two comprehensive accounts of the species of *Astragalus* subgenus *Aegacantha*, Bunge, firstly in Bunge's Monograph, in Mém. Acad. Sc. Pétersb. Sér. VII. xi. and xv. and secondly in Baker's account in the Flora of British India, (ii. 133–135). Bunge's treatment is unsatisfactory mainly owing to the number of species admitted, several of which are founded on unreliable characters. A few inaccuracies have crept in which add to the difficulty of using his key to the species. Baker's account is also unsatisfactory, partly because two of his species, *A. multiceps* and *A. leptocentrus*, are not the same as the plants described by Bunge under these names and partly owing to the collection of several distinct species under *A. polyacanthus*. *A. polyacanthus*, Baker, is a plant with a range in elevation from the plains to 12,000 feet unapproached by any other woody plant in N. W. India.

Ths history of the species in question starts with Bentham's account in Royle, Illustr. Bot. Himal. (1839) 199, where three species are briefly described. *A. polyacanthus*, Royle ex Benth. l.c. is a species which has been much confused. There is an original specimen in Bentham's herbarium now at Kew bearing in Bentham's hand "*Astragalus polyacanthus*, Kunawur Royle 1835." This plant presumably came from Sugnam in Kunawar. Bunge omits *A. polyacanthus*, Royle, presumably because *A. polyacanthus*, Wall. Cat. n. 5934 is a *Caragana*.

A. Grahamianus, Royle ex Benth. l.c. 199, is a plant which cannot be identified with certainty. There is a specimen in Bentham's herbarium named by Bentham but it can scarcely be accepted as the type of the species, as this specimen came from Kunawar, whereas the plant described in Royle l.c. came from "Hills surrounding Kashmir." The locality points to *A. Grahamianus*, Royle, being either *A. cicerifolius*, Royle ex Fischer, or *A. psilocentros*, Fisch. The figure in Royle l.c. t. 36, f. 2, as far as it goes points to *A. psilocentros*, Fisch.

Royle's specimen from Kunawar in Herb. Benth. is *A. cicerifolius*, Royle ex Fischer. It is possible that Bentham referred more than one plant to *A. Grahamianus*, Royle, as he has in other cases so that the most satisfactory course seems to be to drop

the name altogether, especially as *A. Grahamianus*, as accepted by Bunge, and by Boissier, Fl. Orient. ii. 307, is a somewhat different plant, which is found west of the Indus in Afghanistan and Chitral, and not as far as is known in Kashmir.

Astragalus multiceps, Wall. The plant described by Bentham is mainly Royle's plant from Shalkar in Hungarung, *i.e.*, Upper Kunawar. Bentham subsequently discovered that Royle's and Wallich's plants were different as the specimen in his herbarium bears "Astragalus multiceps, Kunawar Royle 1835" and later Bentham has written "non Wall." As *A. multiceps*, Wall. Cat. n. 5937 is *A. Candolleanus*, Royle ex Benth. non Boiss., and *A. multiceps*, Royle is *A. Jacquemontii*, Bunge, it is clearly desirable to drop the name *A. multiceps*, Wall.

The species in Fischer's *Synopsis Astragalorum Tragacantharum* (Bull. Soc. Nat. Mosc. xxvi. II. (1853)), from N.W. India are as follows :—

A. cicerifolius, Royle ex Fisch. l.c. 404. There is no doubt about this plant as the type is Jacquemont's n. 1143, which according to Bunge came from Kashmir. The specimen bearing this number in Herb. Hook. does not mention the locality.

A. psilocentros, Fisch. l.c. 405. The type is Jacquemont's n. 109. This plant did not come from Kashmir as stated by Bunge, l.c. 70, but from "Djillapour" a place in the Salt Range between Pind Dadan Khan and Jhelum.

A. Grahamianus, Fischer excl. diagn. Royle, is *A. Jacquemontii*, Bunge.

A. bicuspis, Fisch. l.c. 406. The type is Jacquemont's n. 1695. This plant came from Upper Kunawar between Lapan and Poya and not from Kashmir as stated by Bunge.

A. psilacanthus, Fisch. l.c. 407 is, as regards Jacquemont's nn. 1543 and 1584, *A. polyacanthus*, Royle. Fischer copies the descriptions of *A. polyacanthus*, Royle, and *A. multiceps*, Wall. verbatim from Royle (l.c.) and does not claim to have seen either nor does he refer any specimens to these species.

The species in Bunge l.c. xv. 67–71 are as follows :—

A. zanskarensis, Benth. ex Bunge. The type is Thomson's plant in Herb. Ind. Or. Hook. f. & Thomson, of which there is one sheet in Herb Kew and one in Herb. Calcutta. The Calcutta sheet is not the same as the Kew sheet and is probably *A. Candolleanus*, Royle, or an allied species, but is not in good condition.

A. bicuspis, Bunge, is the same as Fischer's plant.

A. Grahamianus, Bunge, is, as already pointed out, an Afghan plant allied to *A. cicerifolius*, Royle ex Fischer, but apparently sufficiently distinct for specific rank.

A. Jacquemontii, Bunge. The type is Jacquemont's n. 1640 stated by Bunge to have come from N. W. Himalaya and I think almost certainly came from Kunawar.

A. multiceps, Bunge, is Royle's plant and not Wallich's. As already noted it is *A. Jacquemontii*, Bunge.

A. leptocentrus, Bunge, is as regards Jacquemont's n. 1691 only a villous form of *A. Jacquemontii*, Bunge, and probably came from Kunawar and not from Kashmir as stated by Bunge. Griffith's plant from Cabul I have not seen; nor has Boissier (Fl. Orient. II. 307). There appears to have been some mistake over this specimen, as *A. leptacanthus*, Benth. mss. in herb. Kew, is mainly a plant with many more leaflets looking like a villous form of *A. Candolleanus*, Royle.

A. Daltonianus, Bunge. The types are Thomson's specimens from N. W. Himalaya, 10,000–12,000 feet. There are four sheets in Herb. Kew. All the sheets bear a printed label giving the elevation at which the specimens were collected as 10,000–12,000 feet. From the plants being in full flower and in some cases having vigorous young shoots it is obvious that they could not have been collected at 10,000 feet and over in April and early May. The sheets are much mixed and although they bear Thomson's manuscript labels giving the dates of collection, the specimens on one sheet were possibly not all collected on the same day. The earliest sheet bears the date April 1848, during which time Thomson travelled from Ikardo to Srinagar, and as there is no mention of *Astragalus* in his journal for this month there is no clue to the exact place of collection. The specimens on this sheet are (a & b) *A. Daltonianus* Bunge, (c & d) *A. psilocentros*, Fisch. The next sheet is dated 2nd May 1848 and came from between Srinagar and Pampur. The elevation of Srinagar is about 5250 feet and Pampur not much more. Of the specimens on this sheet a, b, and d are *A. Daltonianus*, Bunge. The next sheet is dated 10th May 1848 and Thomson's specimens came from the Banahal Valley at about 4000–5000 feet. On this sheet specimen (a) is *A. psilocentros*, Fisch. and the label showing that one of the specimens was collected by Flemming in the Salt Range or Murree hills doubtless refers to it. The remaining specimens are *A. Daltonianus*, Bunge. The last sheet is dated 12th May 1848 on which date Thomson was at Nasmon on the Chenab, the elevation of which Thomson states in his journal to be 2700 feet (p. 303). The specimens on this sheet are a, b, and d, *A. Daltonianus*, Bunge, c, *A. psilocentros*, Fisch. A sheet of Thomson's in Herb. Bentham gives the elevation at which *A. Daltonianus*, Bunge, occurs as 5500–7000 feet, which may be accepted as correct as it agrees with the heights at which other collectors have found this plant. Bunge appears to have been misled by a specimen of *A. psilocentros*, Fisch. as he states that the stipules are connate on young shoots in *A. Daltonianus*. The markedly panduriform standard with acutely angled basal lobes which Bunge mentions as a character of *A. Daltonianus* I find to be inconstant and it passes gradually into the form of standard found in *A. cicerifolius*, Royle ex Fischer with which it should be united.

A. psilocentros, Bunge, is Fischer's plant.

A. cicerifolius, Royle ex Bunge. It is not known what plant Royle called *A. cicerifolius*. As neither Bunge nor

Fischer saw an original of Royle's, there is no particular reason for supposing that Bunge is correct and Fischer not. Bunge accepts Thomson's specimens as being correctly named *A. cicerifolius*, Royle, and Fischer accepts Jacquemont's. It is not improbable that Royle named more than one plant *A. cicerifolius*, and as Fischer was the first to take up Royle's herbarium name, Bunge's name cannot be retained. The type of *A. cicerifolius*, Royle ex Bunge, is Thomson's plant from West Tibet, 10,000–14,000 feet. There are 3 sheets of this in Herb. Kew. The first was collected on 21st August 1847 at or near Sugnum in Upper Kunawar. The sheet is mixed, a, b, and c, are *A. cicerifolius*, Royle ex Bunge = *A. oplites*, Benth. mss., d and e are small scraps which are probably *A. polyacanthus*, Royle and *A. Jacquemontii*, Bunge. The second sheet was collected at Le in Ladakh in July 1848 and shows two specimens of *A. oplites*, Benth. The third sheet is mixed and it is not possible to say for certain to which specimens the various labels belong. Specimens a, b and c, are *A. cicerifolius*, Royle ex Fischer, d, is *A. oplites*, Benth., and e, *A. polyacanthus*, Royle (probably), but the specimen is very poor. If they came from Kashmir, Nubra and Ladakh, respectively it would agree with the known distribution of these species, though the arrangement of the labels on the sheet does not suggest these localities. There is also a sheet of Thomson's showing three pieces of *A. oplites*, Benth., in the Calcutta herbarium. They were gathered in Nubra on 2nd September, 1848.

A. tenuispinus, Bunge. The types are Jacquemont's nn. 1543 and 1584. According to Bunge these came from Kashmir and Kunawar. Both are *A. polyacanthus*, Royle; n. 1543 came from between Kanum and Sugnum in Kunawar and n. 1584 I suspect from Lari in Spiti or from Kunawar. Jacquemont calls the plant *A. microphyllus*, and mentions it in his journal (Journ. ii. 259, 345, 372, 405 and 414), for Kunawar and Spiti.

A. scariosus, Benth. ex Bunge, founded on Jacquemont's n. 1143 and sheets of Thomson's, is *A. cicerifolius*, Royle ex Fisch.

As Baker l.c. quotes the synonyms fully it is only necessary to point out that *A. polyacanthus*, Baker, is not Royle's plant. *A. multiceps*, Baker is Wallich's plant, not Royle's. *A. leptocentrus*, Baker, is Bunge's plant only as regards part of Thomson's sheet from between Hango and Lio in Upper Kunawar. With this are mounted two scraps of some other species, possibly *A. zanskarensis*, Benth., from Kargil, Dras. Winterbottom's specimen from Astor (*i.e.*, Hassora not Hazara) is also not *A. leptocentrus*, Bunge. These specimens have much the appearance of a silky-leaved form of *A. Candolleanus*, Royle.

The species known to occur in the N. W. Himalaya are as follows :—

A. polyacanthus, Royle ex Benth. in Royle, l.c. 199, non Baker. *A. psilacanthus*, Fisch. l.c. 407 quoad pl. Jacq. *A. tenuispinus*, Bunge, l.c. xi. 44, xv. 70. *A. microphyllus*, Jacq. Journ. ii. 259.

Kunawar, Ladakh 9–15,000 feet.

A. cicerifolius, Royle ex Fisch. l.c. 404, non Bunge nec Baker. *A. scariosus,* Benth. ex Bunge l.c. xi. 44, xv. 71. *A. Daltonianus,* Bunge l.c. xi. 44, xv. 7.

Chitral, Gilgit, Yarkand, Baltistan, Hazara, Kashmir, Chamba and Kunawar, 4000–8000 feet.

A. psilocentros, Fisch. l.c. 405. *A. polyacanthus,* Baker l.c. 134 ex parte, non Royle. *A. polemius,* Boiss. l.c. 306.

Baluchistan, Waziristan, Kurram, Salt Range.

Var. **pilosus,** *mihi. A. polyacanthus,* Benth. var. *pilosus,* Benth. mss.

Murree Hills, Kashmir, Garhwal, 3000–7000 feet.

A. bicuspis, Fisch. l.c. 406.

Gilgit, Astor, Baltistan, Chamba, and British Lahaul, Kunawar, 8,000–11,000 feet.

A. zanskarensis, Benth. ex Bunge, l.c. xi. 43, xv. 67.

Zanskar, 10,000–14,000 feet.

A. Jacquemontii, Bunge, l.c. xi. 44, xv. 68. *A. Grahamianus,* Fisch. l.c. 406, quoad pl. Jacq. *A. multiceps,* Royle non Wall. *A. leptocentrus,* Bunge. *A. leptocentrus,* Baker, l.c. 135 ex parte.

Kunawar 9000–10,000 feet.

A. oplites, Benth. *A. cicerifolius,* Royle ex Bunge, non ex Fischer.

Yarkand, Nubra, Ladakh, Pangi, Lahaul, Spiti, Kunawar, 12,000–16,000 feet.

XXXIII.—A REVISION OF THE GENUS BELOTIA.

T. A. Sprague.

The incomplete state of our knowledge of the Central American forest flora is well illustrated by the genus *Belotia* (*Tiliaceae*). Up till recently only two species were generally recognized, *B. mexicana,* of which *B. grewiaefolia* was assumed to be a synonym, and *B. insignis.* In 1914 two more were described: *B. panamensis,* Pittier, from Panama, and *B. Lessertiana,* Hochr., from Cuba. By the separation of *B. grewiaefolia,* and the description of six new species, the number is now raised to eleven, and it is probable that others remain to be discovered. The known area of the genus stretches from the Mexican States of Vera Cruz and Guerreo to Panama, Cuba and St. Lucia. It may be found to extend into South America when the Pacific Coast forests of Colombia have been more fully explored.

The history of *Belotia* commences in 1824 with the description of *Grewia mexicana,* DC., a Mexican species doubtfully assigned

to *Grewia* in the absence of fruit.* In 1845 Achille Richard founded the genus *Belotia* on a single species, *B. grewiaefolia*, collected by Valenzuela in Cuba.† Richard cited *Grewia mexicana*, DC., which he does not appear to have seen, as a synonym of *B. grewiaefolia*, on the strength of De Candolle's description. His remarks are as follows :—" La plante que nous venons de décrire nous paraît être la même que l'espèce de M. de Candolle, autant du moins qu'il nous a été permis d'en juger, par le caractère peu détaillé que ce savant a donné de son espèce; et en effet notre plante de Cuba a bien le port et les caractères extérieurs d'un *Grewia*; mais l'analyse que nous avons faite de sa fleur et particulièrement celle de l'ovaire nous ont fait découvrir dans notre plante des différences qui la distinguent immédiatement du genre *Grewia*." As will be seen from the key, and the remarks under *Belotia mexicana* and *B. grewiaefolia*, these two species differ in the shape, texture, indumentum and marginal teeth of the leaves, the inflorescence and the size of the flowers.

The principal diagnostic characters of *Belotia* are the presence of nectaries at the base of the petals, and their absence on the androgynophore; the blue or violet, rarely white petals; the bilocular ovary with pluriovulate loculi; the loculicidal capsule, strongly compressed transversely to the septum; and the discoid ciliate seeds. In all these respects *Belotia* resembles the Old-World genus *Trichospermum*, which differs in having a pair of nectaries at the base of the lamina, and a pseudo-umbellate inflorescence. As King pointed out,‡ the descriptions of *Trichospermum* published by previous authors were very inaccurate, with the result that it was assigned by Bentham and Schumann to the tribe *Tilieae*, instead of being placed by the side of *Belotia* in the *Grewieae*. In Hochreutiner's revised classification of the *Tiliaceae*, however, both genera are correctly referred to the *Grewioideae-Grewieae*.§

Misled by A. Richard's reduction of *Grewia mexicana* to *Belotia grewiaefolia*, Turczaninov re-described *G. mexicana* as a supposed new species, *Belotia Galeottii*, from specimens collected by Galeotti (No. 4621) in Vera Cruz. Hemsley suggested that *Grewia mexicana* and *Belotia Galeottii* were conspecific, and Hochreutiner united them, but neither they nor any other authors seem to have suspected that Richard's identification of the Cuban *Belotia grewiaefolia* with the Mexican *Grewia mexicana* was erroneous.

Further confusion was introduced by Bentham's reduction of *Adenodiscus*, Turcz., to *Belotia*,‖ which was accepted by Hemsley and Schumann. Turczaninov founded the new genus and species,

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* DC. Prodr. i. p. 510 (1824).
† La Sagra, His. Ile Cuba, Bot. i. p. 207 (1845), Atlas t. 21 (1853).
‡ Mat. Fl. Mal. Penins. i. p. 228 (1891).
§ Ann. Conserv. et Jard. Bot. Genève, xviii.–xix. p. 80 (1914).
‖ Benth. et Hook. f. Gen. Pl. i. p. 233 (1862).

Adenodiscus mexicanus, on *Galeotti* 4154 from Vera Cruz, and described it as having yellow flowers, eglandular petals, five antepetalous glands on the androgynophore, and leaves with glanduliferous basal serratures. These characters, which are inconsistent with *Belotia*, suggested to the writer that *Adenodiscus mexicanus* might be a species of *Heliocarpus*, in spite of the fact that the ovules were described as numerous; and a search in the Kew Herbarium resulted in the discovery of a duplicate of the type number, which agrees with Turczaninov's description except that the ovules are only two in each loculus. It is a very distinct species of *Heliocarpus*, with leaves which are unusually glabrous for the genus, but have tufts of hairs in the axils of the veins on the lower surface. This character is mentioned by Turczaninov, and also by Hochreutiner, who redescribed another duplicate of the type number as a supposed new species, *Heliocarpus glabrescens*.* It should now bear the name *Heliocarpus mexicanus* (Turcz.) Sprague, comb. nov.

It may be useful to mention some of the chief characters which serve to distinguish the various species of *Belotia*. Perhaps the most important is the nature of the indumentum on the leaves, as is often the case in the *Tiliaceae*. In some species, such as *B. mexicana*, all the hairs are in one tier, whilst in others, such as *B. Campbellii*, there is a lower tier of relatively small and crowded hairs, and an upper of larger and more distinct ones. The veinlets are finely but strongly reticulate on the upper surface in *B. reticulata* and, to a less extent, in *B. grewiaefolia* and *B. Lessertiana*. The shape and direction of the marginal teeth also afford useful characters. There is considerable diversity in the inflorescence: *B. panamensis* is unique in its 1–3-flowered cymes; *B. grewiaefolia* has a small, relatively compact inflorescence; and *B. tabascana* is easily recognized by its small inflorescences in the axils of foliaceous bracts on axillary short-shoots. The size of the flowers and the general shape of the petals are relatively constant, but the apex of the petals may vary in certain species, even in the same flower, some petals being distinctly bifid and others irregularly toothed or subentire. The shape and size of the capsule is of great importance.

Belotia, *A. Rich.* in La Sagra, Hist. Ile Cuba, Bot. i. p. 207 (1845), Atlas t. 21 (1853); Benth. in Benth. et Hook. f. Gen. Pl. i. p. 233 (1862) excl. syn. *Adenodiscus*, Turcz.; K. Schum. in Engl. et Prantl., Nat. Pflanzenf. iii. 6, p. 28 (1890), excl. syn.

Flores pentameri. *Sepala* exappendiculata. *Petala* ligularia vel oblongo-spathulata, apice plus minusve bifida vel dentata, basi intus area ciliata nectarifera instructa, caerulea vel violacea, rarius alba. *Androgynophorum* nudum, apice discum late ciliatum gerens. *Stamina* numerosa, libera; antherae suborbiculares. *Ovarium* biloculare; loculi pluriovulati; ovula biseriata. *Capsula* bilocularis, septo contrarie valde compressa, loculicida. *Semina*

* Ann. Conserv. et Jard. Bot. Genève, xviii.–xix. p. 122 (1914).

discoidea, longe ciliata. *Arbores* mediocri vel magni, foliis indivisis, serrulatis vel denticulatis saepissime acuminatis, inflorescentia cymosa saepius thyrsoidea.

Species adhuc cognitae 11, Mexici, Americae centralis, Panamae, Cubae et Sanctae Luciae incolae. Typus, *B. grewiaefolia*, A. Rich.

Key to the Species.

Cymes 1–3-flowered; sepals 7·5-8 mm. long; capsule 1·4 cm. long, 2 cm. broad - - 5. *panamensis.*

Cymes many-flowered:

Leaves acute or very shortly acuminate, nearly concolorous, pubescent above, coarsely pubescent or tomentose beneath; sepals about 1·2 cm. long; capsule transversely elliptic, slightly retuse, 1·8 cm. long, 2·8 cm. broad - 1. *insignis.*

Leaves rather long acuminate:

Leaves very thin, subconcolorous, sparingly pubescent beneath; capsule obovate-deltoid, slightly retuse or subtruncate, 1–1·1 cm. long, 1·3–1·4 cm. broad - - - - - 8. *grewiaefolia.*

Leaves firmly chartaceous or subcoriaceous, discolorous, tomentose tomentellous or densely pubescent beneath:

Leaves very finely and smoothly tomentellous beneath, hairs in a single tier:

Leaves denticulate, teeth ascending; upper surface glabrescent, minutely and strongly reticulate; nerves on lower surface pubescent with large scattered hairs - - 9. *reticulata.*

Leaves minutely serrulate, teeth appressed; upper surface minutely pubescent, not strongly reticulate; nerves on lower surface finely and densely pubescent or tomentellous 4. *mexicana.*

Leaves coarsely pubescent or tomentose beneath, or tomentellous, with a tier of much larger hairs above the basal indumentum:

Sepals 10·5–12·5 mm. long:

Leaves oblong-lanceolate obtuse at the base, denticulate; upper part of petals glabrous inside - 2. *macrantha.*

Leaves ovate-lanceolate, rounded or subcordate at the base serrulate; upper part of petals pilose on both surfaces - - - - - - 3. *grandiflora.*

Sepals 5–7 mm. long:

Leaves densely tomentose beneath; branchlets ferrugineous-tomentose:

Leaves elliptic, minutely and distantly denticulate, glabrous or subglabrous above, minutely and strongly reticulate 7. *Lessertiana.*

Leaves oblong-lanceolate, rather closely denticulate, at first minutely and densely pubescent above, finally subglabrate, not reticulate - - 6. *caribaea.*

Leaves not densely tomentose beneath; branchlets not ferrugineous-tomentose:

Inflorescences on long-shoots, in the axils of adult or nearly adult foliage leaves; petals ligulate - - - - - - - 10. *Campbellii.*

Inflorescences on axillary short-shoots in the axils of very young foliage-leaves (or foliaceous bracts); petals oblong spathulate - - - - - - 11. *tabascana.*

1. **B. insignis,** *Baill.* in Adansonia, x. p. 182 (1872); Hemsl. Biol. Centr.-Amer., Bot. i. p. 137 (1879).

Mexico. Guerrero: near Acapulco, *Palmer* 146. Temperate Andes of Mexico, *Ghiesbreght* 356 (ex *Baill.* l.c.).

Differs from all other known species of *Belotia* by the leaves, which are merely acute or at the most very shortly acuminate, and the large size of the flowers and capsules. According to Baillon, *B. insignis* is a lofty tree with violet flowers.

2. **B. macrantha,** *Sprague,* sp. nov.

Arbor 6–9 m. alta. *Ramuli* juniores velutini vel dense pubescentes, mox glabrescentes, elevato-reticulati; internodia 2–3 cm. longa. *Folia* oblongo-lanceolata, longe acuminata, basi obtusa, 13–17·5 cm. longa, 4·5–6 cm. lata, acumine 0·8–3 cm. longo, glandulari-denticulata, denticulis ascendentibus 1·5–5 mm. distantibus, firme chartacea, valde discolora, supra exsiccando brunnea, minute sparse pubescentia vel puberula, subtus indumento griseo duplici, inferiore minute tomentello, superiore grosse pubescente; petioli velutini, 1–1·5 cm. longi. *Thyrsi* axillares, aphylli, 4–6 cm. longi, vel foliaceo-bracteati, usque ad 10 cm. longi. *Alabastra* circiter 1 cm. longa. *Sepala* rubella, 10·5–12·5 mm. longa, 2·75–3·25 mm. lata. *Petala* pallide

caerulea, oblanceolato-ligularia, apice saepius plus minusve bidentata, 1–1·1 cm. longa, 2·25–2·75 mm. lata (parte superiore intus glabra.) *Stylus* 3–3·5 mm. longus, infra medium dense stellato-pilosus. *Capsula* ignota.—*Belotia* n. 4, Hemsl. Biol. Centr.-Amer., Bot. i. p. 137 (1879).

Panama. On slopes of wooded hills at Paraiso railway-station, fl. Dec., *Sutton Hayes* 438 (Herb. Kew et Mus. Brit.).

Allied to *B. mexicana*, to which Hemsley (l.c.) was inclined to refer it. It may be distinguished by the denticulate leaves, the less conspicuous transverse nerves on the upper surface, the indumentum and the larger flowers. According to Sutton Hayes it is a tree 20–30 ft. high, with reddish calyx and pale blue petals.

3. **B. grandifolia,** *Sprague*, sp. nov.

Ramuli juniores fulvo-tomentelli et pilis majoribus grosse pubescentes; internodia 2·5–3 cm. longa. *Folia* ovato-lanceolata, longe acuminata, basi rotundata vel subcordata, 17·5–20 cm. longa, 8–9·5 cm. lata, acumine ut videtur circiter 1·5 cm. longo, glandulari-serrulata, denticulis appressis 1·5–5 mm. distantibus, firme chartacea, discolora, supra exsiccando vix brunnescentia, minute puberula vel glabrescentia, subtus indumento duplici, inferiore minute tomentello, superiore pubescente, nervis longe patenter pilosis; petioli 1·5 cm. longi, pariter ut ramuli induti. *Thyrsi* in axillis foliorum superiorum orti, superiores aphylli, 3–6 cm. longi, inferiores foliati, usque ad 15 cm. longi. *Alabastra* circiter 1 cm. longa. *Sepala* 1·2–1·25 cm. longa, 2·75–3 mm. lata. *Petala* ligularia, apice bidentata, 10·5 mm. longa, 1·25 mm. lata, utrinque pilosula, area basali nectarifera obreniforme.

Mexico. Vera Cruz: Zacuapan; on sunny hills, 1200 m., fl. Aug.–Sept., *C. A. Purpus* 1916 (Mus. Brit.).

Nearly related *to B. macrantha*, from which it differs by the characters indicated in the key, and in the inversely reniform nectaries.

4. **B. mexicana,** *K. Schum.* in Engl. et. Prantl, Nat. Pflanzenf. iii. 6, p. 28 (1890), excl. syn. *B. grewiaefolia*; Hochr. in Ann. Conserv. et Jard. Bot. Genève, xviii.–xix. p. 90 (1914, excl. *B. grewiaefolia.*

Grewia mexicana, DC. Prodr. i. p. 510 (1824).

Belotia Galeottii, Turcz. in Bull. Soc. Nat. Mosc. xix. 2, p. 504 (1846); Hemsl. Biol. Centr.-Amer., Bot. i. p. 137 (1879), excl. stirp. nicarag.

B. grewiaefolia, Hemsl. l.c. 136, excl. stirp. cubens. et syn. *Adenodiscus mexicanus:* non. A. Rich.

Mexico. Vera Cruz: in ravines at 900 m., *Galeotti* 4261. Jalapa, *Galeotti*. Sierra San Pedro Nolasco, Talea, etc., *Jurgensen* 772. Montecinos, *Linden* 43. Between Vera Cruz and Orizaba, *Fr. Muller* 2231. Without precise locality, *Harris*.

As suggested by Hemsley (l.c.) and confirmed by Hochreutiner (l.c.), *B. mexicana* and *B. Galeottii* are conspecific. *B. grewiaefolia*, A. Rich., however, which has been identified with *B. mexi-*

cana by A. Richard, Bentham (Gen. Pl. i. p. 234), K. Schumann, Hemsley and Hochreutiner, differs in the shape, texture, denticulation and indumentum of the leaves, the compact inflorescence and the smaller flowers. It appears to be confined to Cuba.

Adenodiscus mexicanus, Turcz., which was reduced by Bentham and Hemsley to *Belotia grewiaefolia*, A. Rich., is *Heliocarpus mexicanus*, Sprague (*H. glabrescens*, Hochr.).

According to Galeotti (n. 4261), *Belotia mexicana* is a tree 50–60 ft. high, with pale violet flowers. Linden (n. 43) described the flowers as lilac.

5. **B. panamensis,** *Pittier* in Fedde, Repert. xiii. p. 313 (1914).

Panama. Canal Zone, *Pittier* 2584; *Maxon* 4736 (ex *Pittier*). Southern Darien, *Williams* 772 (ex *Pittier*).

According to Pittier, *B. panamensis* is a tree 13–33 ft. high, with purple flowers. It is evidently related to *B. macrantha*, but has few-flowered inflorescences and smaller flowers.

6. **B. caribaea,** *Sprague*, sp. nov.

Ramuli dense ferrugineo-tomentosi. *Folia* lanceolata, longe acuminata, basi obtusa vel rotundata, 10·5–16 cm. longa, 3–5·7 cm. lata, acumine 1·5–2 cm. longo, denticulato-serrulata, denticulis ascendentibus 1·5–3·5 mm. distantibus, firme chartacea, valde discolora, supra exsiccando brunnea minute dense pubescentia, tandem glabrescentia, subtus dense tomentosa; petioli 1–1·4 cm. longi. *Thyrsi* plures, 2·5–5 cm. longi, paniculam terminalem efficientes. *Sepala* 6 mm. longa, 1·75 mm. lata. *Petala* oblanceolato-ligularia vel spathulato-ligularia, apice bidentata, 5·5–7 mm. longa, 1–1·2 mm. lata. *Capsula* transverse elliptica, apice subtruncata, 1 cm. longa, 1·2 cm lata.

West Indies. St. Lucia, *Anderson*.

An unlocalized specimen from *herb. Miller* (Mus. Brit.) also belongs to this species. It is described in the Solander MSS. under a manuscript name not reproduced here.

Related to *B. mexicana*, from which it may be separated by the indumentum, the denticulation of the leaves and the smaller flowers.

7. **B. Lessertiana,** *Hochr.* in Ann. Conserv. et Jard. Bot. Genève, xviii–xix. p. 90 (1914).

Cuba. Havana, *Delessert* (ex *Hochr.* l.c.).

Apparently allied to *B. grewiaefolia*, from which it may be distinguished by the minutely and distantly denticulate leaves, densely tomentose on the lower surface.

8. **B. grewiaefolia,** *A. Rich.* in La Sagra, Hist. Ile Cuba, Bot. i. p. 209 (1845), Atlas t. 21 (1853), excl. syn.; Griseb. Cat. Pl. Cub. p. 30, n. 8 (1866), excl. syn.; Sauvalle, Fl. Cub. p. 15, n. 248 (1873).

Vernacular Names. Majagua macho, Majagüilla macho, Guacimilla.

Cuba. Vuelta de Abajo, in clayey soil, *Valenzuela* (ex *A. Rich.* l.c.). Without precise locality, *C. Wright* 2090 (Herb. Kew. et Mus. Brit.).

The salient characteristics of *B. grewiaefolia* are the very thin leaves, glabrescent and minutely reticulate on the upper surface, minutely and sparingly pubescent on the lower, the small flowers, and the short compact terminal inflorescence. Wright's no. 2090 agrees with Richard's description and figure except that the leaves are more closely denticulate.

According to A. Richard, *B. grewiaefolia* is a fairly tall tree with white flowers.

9. **B. reticulata,** *Sprague*, sp. nov.

Ramuli juniores breviter ferrugineo-tomentosi. *Folia* ovato-lanceolata vel lanceolata, longiuscule acuminata, basi inaequaliter obtusa vel rotundata, 9·5–16·5 cm. longa, 3–7 cm. lata, acumine 1–1·5 cm. longo, denticulato-serrulata, dentibus ascendentibus 1·5–4 mm. distantibus, firme chartacea, supra juventute minute sparse pubescentia, mox puberula vel glabriuscula, minute valde reticulata, subtus subfulvo-tomentella, nervis conspicue prominentibus pilis majoribus sparsiuscule pubescentibus; petioli 1–2 cm. longi. *Alabastra* juvenilia tantum visa. *Petala* ut videtur ligularia. *Capsula* transverse elliptica, valde retusa, 1·6–1·7 longa, 2–2·1 cm. lata.—*B. Galeottii*, Hemsl. Biol. Centr.-Amer., Bot. i. p. 137 (1879), partim; Goyena, Fl. Nicarag. p. 206 (1911); non Turcz.

Nicaragua. Chontales, *Seemann* 11 (type), 12 (Herb. Kew. et Mus. Brit.).

Apparently most nearly allied to *B. Campbellii*, from which it differs in the indumentum of the leaves and the much larger, strongly retuse capsules.

10. **B. Campbellii,** *Sprague*, sp. nov.

Arbor. *Ramuli* dense pubescentes, tandem longitudinaliter rugosi; internodia 1·5–4 cm. longa. *Folia* ovato-lanceolata, longe acuminata, basi rotundata vel obtusa, 11–18 cm. longa, 4–7·5 cm. lata, acumine 1–2 cm. longo, denticulato-serrulata, dentibus ascendentibus 1·5–4 mm. distantibus, firme chartacea, valde discolora, supra exsiccando brunnescentia, sparse pubescentia vel puberula, tandem minute subtiliter reticulata, subtus indumento duplici, inferiore minute tomentello vel dense pubescente, superiore grosse pubescente; petioli velutini, 1–1·5 cm. longi. *Thyrsi* 2–4 cm. longi in axillis foliorum superiorum et bractearum foliacearum, inflorescentiam circiter 10 cm. longam efficientes. *Sepala* 6·5–7 mm. longa, 1·75–2 mm. lata. *Petala* ligularia, superne paullulo ampliata, apice bifida, 6–7 mm. longa, 1–1·2 mm. lata. *Capsula* transverse elliptica, leviter retusa vel subtruncata, vix 1 cm. longa, 1·3 cm. lata.

Vernacular Names. Moho, Balsa.

British Honduras. Seven Hills Estate, *Campbell* 75 (type). Sibun River, *Campbell* 81. Stann Creek, about 12 miles from Stann Creek town, *Hummel*.

Named after Mr. E. J. F. Campbell, for many years Curator of the Botanic Station, British Honduras, who has from time to

time contributed dried specimens to the Kew Herbarium. According to Mr. C. Hummel, Forestry Officer, British Honduras, the name "Balsa Wood" is applied in British Honduras to the wood of three different trees, namely, "Pollak" (*Ochroma* sp.), "Moho" (*Belotia Campbellii*) and "Quamwood" (*Schizolobium Kellermanii*).

11. **B. tabascana,** *Sprague,* sp. nov.

Ramuli dense pubescentes, demum glabrescentes, longitudinaliter rugulosi; internodia 1·5–2·5 cm. longa. *Folia* ovata vel ovato-oblonga, longiuscule acuminata, basi rotundata vel subtruncata, 6–13·5 cm. longa, 2·5–6·5 cm. lata, acumine 0·5–1 cm. longo, serrulata, denticulis ascendentibus vel subappressis 1–3 mm. distantibus, firme chartacea, valde discolora, supra exsiccando brunnea, minute asperula pubescentia vel puberula, nervis grossius pilosis, subtus indumento duplici, inferiore griseo minute tomentello, superiore fulvescente grosse pubescente; petioli dense grosse pubescentes, 1–1·5 cm. longi. *Thyrsi* 1–1·5 cm. longi, pluriflori, in axillis foliorum juvenilium (seu bractearum foliacearum) in ramulis axillaribus abbreviatis 2·5–5 cm. longis. *Sepala* 5·5–6·5 mm. longa, 1·5–1·75 mm. lata. *Petala* oblongo-spathulata 5–5·5 mm. longa, 1·3–1·4 mm. lata, subintegra vel apice irregulariter plus minusve biloba. *Capsula* ignota.

Vernacular Name. Palincano.

Mexico. Tabasco: Lomas de San Sebastian; fl. March, *Rovirosa* 416.

A well-marked species, distinguished at the first glance by the thyrses, which are borne in the axils of very young leaves (or foliaceous bracts) on axillary short-shoots. The leaves are relatively short and broad, and are asperulous on the upper surface.

Synonyma excludenda.

Adenodiscus, Turcz. = **Heliocarpus,** *Linn.*

A. mexicanus, Turcz. = **H. mexicanus,** *Sprague* (*H. glabrescens,* Hochr.).

XXXIV.—NEW OR NOTEWORTHY SOUTH AFRICAN PLANTS.—III.*

Joseph Burtt-Davy.

11. **Indigofera Evansiana,** *Burtt-Davy* [Leguminosae-Galegeae]; *I. Woodii,* Bolus, affinis, sed foliolis angustioribus et non distincte mucronatis differt.

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* The following ten numbers (11–20) were intended for publication with Nos. 1–10, in Part I. (*Kew Bull.* 1921. p. 49), but were accidentally omitted; they are therefore published here as Part III. Part II. appeared in *Kew Bull.* 1921, p. 191.

Caules 12·5–14 cm. alti, foliosi, a basi ramosi, perspicue annui, e collo perenni crescentes. *Folia* circiter 5–8 mm. in caule distantia, 1·8–2 cm. longa, foliola opposita, 8–10-juga, strigosa, 5–6 mm. longa, 1–1·5 mm. lata; stipulae minutae, subulatae, recurvatae. *Pedunculi* 2–3 cm. longi; pedicelli circiter 3 mm. longi. *Calycis* lobi subulati. *Legumina* numerosa (5–8), terminalia, 1·2–1·8 cm. longa, 2–2·5 mm. lata, sparse appresso-strigosa, rostrata.

South Africa. Transvaal: Wakkerstroom Distr.; Amersfoort, circa 1700 m., Mch. 15, 1917 (in fruit), *Burtt-Davy* 17345 *in herb. Bolus.*

Named in memory of the late Maurice S. Evans of Natal, who collected and described several new plant-species, and who collaborated with the late Dr. J. Medley Wood, A.L.S., in the publication of *Natal Plants.*

12. **Combretum Millerianum,** *Burtt-Davy* [Combretaceae]; *C. Buchanani,* Engl. & Diels, *C. gazensi,* Bak. f., et *C. suluense,* Engl. & Diels, affine.

Arbor. Folia ramulorum juvenilium opposita vel subopposita; petioli 1·3 cm. longi, robusti, puberulentes; laminae foliorum 12·7–18 cm. longae, 7·5–10 cm. latae, oblongae, obtusae vel aliquanto apiculatae, ad basim truncatae vel rotundatae, in pagina superiore brunneo-virides et glabrae, in inferiore autem pallidae, in axillibus nervorum pubescentes, alibi sparse lepidotae, nervis supra leviter impressis infra prominentibus. *Flores* non vidi. *Fructus* rubro-fusci, 4 cm. longi, 2·5–3 cm. lati, 4-alati, alis circiter 1 cm. latis; pedicelli 3 mm longi.

South Africa. Swaziland: Lubombo Flats; between Buckham's and Forbes' Coal-mine, plentiful, June 22, 1911 (in fruit), *Burtt-Davy* 10681 *in herb. Bolus.*

This species belongs to the Section *Glabripetalae* of Engler and Diels; it is named after Mr. Allister M. Miller, the Swaziland pioneer and enthusiast.

13. **Tarenna**(?) **papyracea,** *Burtt-Davy* [Rubiaceae-Gardenieae]; *T. tetramerae,* Hiern, et *T. grandiflorae,* Hiern, affinis, sed foliis amplis papyraceis (fere translucidis) penninerviis distinguitur.

Arbor parva, ramuli juveniles pubescentes. *Folia* ampla, papyracea (fere translucida), subsessilia; petioli 3 mm. longi, pubescentes; laminae 14–18 cm. longae, 5–5·7 cm. latae, oblongae, acutae, vel aliquanto acuminatae, in petiolum gradatim acuminatae, sparse punctatae et supra (praecipue in nervis) pilis patentibus pilosae, infra in costa prominente hirsutae; nervi secondarii hirsuti aliquanto prominentes, tenues, penninervii, 6–9 mm. inter se distant; nervi angulo 90 costa reserti. *Flores* non vidi.

South Africa. Transvaal: Pietersburg Distr.; Houtboschberg forests, *Burtt-Davy* 5091, *in herb .Bolus.*

14. **Allophylus transvaalensis,** *Burtt-Davy* [Sapindaceae-Sapindeae]; *A. melanocarpo*, Arn., affinis, fructibus autem majoribus (5–6 mm. longis) et rubris, petiolis et partibus juvenilibus dense tomentosis differt.

Arbor parva vel frutex, novellis hirsutis, pilis longis et patentibus. *Foliola* supra sparse, et praecipue in costa, pilis erectis setosis setigera. *Racemi* non saepe ramosi.

South Africa. Transvaal: Pietersburg Distr.; Houtbosch, *Rehmann* 5567 *in herb. Kew.* (type); Modjadjies Mt., in Mrs. Eland's "Bush," 1250–1280 m., native name "Musunquani Soadi," *Burtt-Davy* 2678 *in herb. Bolus*; Swiss Mission Sanatorium near Shilouvane, in the forest, shrub about 3 m. high, *Junod* 1421.

Dr. Szyszylowicz (*Plantae Rehmannianae*) doubtfully refers *Rehmann's* 5566 to *Schmidelia magica*, Baker, but does not mention his 5567.

15. **Allophylus Sprague anus,** *Burtt-Davy* [Sapindaceae-Sapindeae]; *A. melanocarpo*, Arn. et *A. transvaalensi*, Burtt-Davy, affinis, foliolis terminalibus late ovatis apicem versus acute dentatis, pilis non in axillis costae et nervorum aggregatis differt.

Arbor parva, 8–10 m. alta. *Folia* nec setigera nec tomentosa, sed molliter pilis porrectis pubescentia. *Foliola* supra pilis sparsis vestita, apicem versus acute et grosse dentata, basi integra et cuneata, terminale late-ovatum, 6 cm. longum, 4 cm. latum.

South Africa. S. Rhodesia: Victoria Falls; damp ground, *C. E. F. Allen* 143 *in herb. Kew.*

16. **Adenia angustisecta** *Burtt-Davy* [Passifloraceae-Modecceae]; species foliorum lobis angustissimis longisque facile distincta.

Herba scandens (?). *Caules* succulentes (?), sicci 6 mm. lati, annui (?) e collo perenni crescentes. *Rami* breves, cirris brevibus gracilibusque. *Folia* 5-palmatisecta, glabra, petiolis 3–5 mm. longis glandibus duobus magnis ad apicem munita, stipulis subulatis deciduis. *Foliorum* lobi anguste lineares, ad 8·5 cm. longi et 1–3 mm. lati, plicati. *Flores* ♀ pedunculati, languide purpurascentes; ♂ non vidi. *Calyx* 8 mm. longus, tubo circiter 4 mm. longo, lobis 4 mm. longis et 2 mm. latis. *Petala* circiter 4 mm. longa.

South Africa. Transvaal: Lydenburg Distr.; Ohrigstad Valley, Oct. 23, 1908, *H. G. Mundy in T. D. A. Herb. No.* 4700 *in herb. Bolus.*

The specimen is obviously a young spring shoot, and the leaves are, perhaps, not fully developed. The tendrils appear inadequate to support the weight of the plant, and from the scrappy material available (a shoot about 2 dm. high), it is not evident that the plant climbs. The stipules are well-developed for the genus.

17. **Cynodon transvaalensis,** *Burtt-Davy* [Gramineae-Chlorideae]; species bene distincta, a *C. Dactylone,* Pers, habitu teneriore flaccidiore densiore caespitoso, colore viridi nec glauco, spicis binatis brevioribus ad basim nudis, glumis brevioribus majoribus acuminatis, et valva dorso minus ciliata, imprimis differt.

Herba perennis, repens, densissime caespitosa. *Culmi* tenuissimi. *Folia* brevia, viridia (nec glauca), flaccida, acutissima nec pungentia, sparse pilosa, ad os vaginae barbata, 1·2–5 cm. longa vel longiora, ad 1·5 mm. lata, vaginibus saepe purpurascentibus glabrisque. *Pedunculi* tenuissimi. Spicae digitatae, binatae, 1–2 cm. longae, ad basim nudae. Spiculae 2·5 mm. longae; rhachilla prolongata, tenuis. *Glumae* subaequales, 1 mm. longae, carina glabra. *Valva* ad apicem sparse ciliata vel glabra.

South Africa. Transvaal: Vereeniging Distr.; Burttholm (Uitgevallen 197), *Burtt-Davy* 18156 (type) *in herb. Kew.*; Ermelo Distr., Lake Chrissie, *Burtt-Davy*; Witwatersrand Distr., Germiston, *Burtt-Davy,* and elsewhere along the Reef. Usually growing in moist, open places subject to flooding in the rainy season, on the margins of pans and dams.

A strikingly distinct species, which I named provisionally some years ago, but did not publish as it was desirable to compare it with authentic material of *C. pascuus,* Nees; this has now been done and my plant proves to be quite different from the latter, which appears to be only a form of *C. Dactylon,* Pers. I have had *C. transvaalensis* under cultivation for many years, under precisely similar conditions of soil, moisture, exposure, etc., and alongside of, both *C. Dactylon,* Pers., and *C. incompletus,* Nees; it retains its characters without showing any tendency to vary in the direction of either species. Transplanted from the damp sandy soil of a dam margin to a harder and drier soil, it also retains its characters. The distachyous inflorescence is found in luxuriant forms, as well as in those less well-grown, and is therefore not attributable to starvation nor to xerophytic conditions, as is the case with starved forms of *C. Dactylon,* Pers. (*e.g.*, from Uitenhage, *Zeyher* 446, Claremont Flats, *Schlechter* 151, and Somerset East, *MacOwan* 2119 all *in herb. Mus. Brit.*). In habit and foliage *C. transvaalensis* is not unlike the Australian *C. tenellus,* R. Br., but differs in the inflorescence.

Two Australian specimens of *C. Dactylon,* Pers. at Kew (from "Murray," *F. von Mueller* and "Victoria," *Robertson* 581) bear some resemblance to *C. transvaalensis,* but differ in the more robust habit, more hairy sheaths, apparently more rigid leaves, spikelets more imbricate and clothing the spikes to the base, longer glumes, and more ciliate valves. The first cited bore the MSS. name *C. Dactylon β distachyus,* F. v. Mueller.

Owing to its rapidly spreading, compact, dense habit of growth and soft springy nature, *Cynodon transvaalensis* is excellent for lawns, bowling greens, etc., for which purposes it is now the principal grass used in the Transvaal, under the names

of " Florida Kweek " or " Florida grass " (after the township of Florida, near Johannesburg) " Germiston Grass," etc. It is a favourite with leaf-cutting Termites, which sometimes give it a rather moth-eaten appearance if not kept properly mown, but it is well worth introduction into warm countries, for lawn purposes.

18. **Convolvulus ornatus,** *Engl.*; Fl. Cap. iv. Sec. 2, p. 76.

South Africa. Transvaal: Bloemhof Distr., farm " Kaffraria " near Christiana, occasional, *Burtt-Davy* 12747, Mch. 1912, and 14031, May 1912; near Schweizer Reneke, *Burtt-Davy*. British Bechuanaland: Vryburg Div., Armoed's Vlakte, Dec. 21, 1911, *Burtt-Davy* 11729; Klipvlakte, *Burtt-Davy* 11127. Orange Free State: Bloemfontein Distr., Bester's Put, *Burtt-Davy* 11774. Also in Griqualand West and the Carnarvon Division of the Cape Province.

An extension of known range. This plant is distinctly characteristic of the Southern Bechuanaland Region, and its occurrence in the Bloemhof District is another interesting connecting link between that Region and the S. W. Transvaal.

19. **Erigeron linifolius,** *Willd.* [Compositae-Astereae]; *E. canadensis*, Tenore Syll. Fl. Neap. 428, non L.; *Conyza ambigua*, DC. Fl. Fr. Suppl. 468; *Erigeron ambiguus*, Sch. Bip. in Webb. & Berth. Phyt. Canar. ii. 208, non Nutt. nec F. Muell.; *E. bonariensis*, Hort. ex Link Enum. Hort. Berol. ii. 323 (non L. ?).

South Africa. Transvaal: Vereeniging Distr., Uitgevallen 197, 1480 m. alt., *Burtt-Davy in herb. Bolus*; Marico Distr., near Zeerust, 1190 m., Nov. 1907, *Burtt-Davy*; Pretoria, *Wilms* 672, *Lansdell* 68; Modderfontein, *Conrath* 379; Rustenburg, 1400 m., *Nation* 270; Potchefstroom, Witbank, Johannesburg, Lydenburg, Volksrust and elsewhere throughout the settled parts of the Province, common as an alien weed of cultivated lands, stubble, waste places, borders of fields, etc. Basutoland: Leribe, 1830–2130 m. alt., *Dieterlen* 339. Cape Province: Bathurst Div., Martindale, 1915, *Salisbury in herb. Cantab.*, " a far more common weed than *E. canadensis* in S. Africa, and in Australia evidently confounded with it in Floras "; Cape Peninsula: near Klein Constantia and Claremont, *Wolley-Dod* 1302, 2050; Burgher Redoubt, Woodstock, April 1920, *Burtt-Davy* 18928 *in herb. Cantab.*

Considered to be a native of Western Asia, but now widely distributed through the Mediterranean Region, the Madeira, Canary, Cape Verde and Azores Isls., the Southern United States, Australia, Ceylon, India and South Africa. Said to have been introduced into Ceylon in 1864, with seeds from St. Petersburg.

It is browsed freely by horses and cattle, but is a troublesome weed, tenacious, rapidly spreading and with a tough deeply penetrating tap-root, not easily eradicated when well established.

20. **Erigeron canadensis,** *L.*; Sowerby, Engl. Bot. t. 2019; Syme, Engl. Bot. t. 773 (both good); *Leptilon canadense* (L.) Britt. & Br., Illustr. Fl. N. Amer. & Canad. iii. 391, fig. 3827 (figure poor and showing a smooth pappus).

South Africa. Without precise locality (probably Caledon River, O. F. S.), *Zeyher* 805 *in herb. Cantab. ex herb. Lemann*, 1852. Transvaal: Vereeniging Distr., Uitgevallen 197, *Burtt-Davy*; Marico Distr., Matebe Valley, *Holub*; Rustenburg, *Nation* 198. Natal: without precise locality, *Cooper* 1267; Inanda, *Wood*. Orange Free State: Caledon River (Wepener Distr.?), Jan. 1841, *Burke*; Harrismith, *Sankey* 101. Cape Province: Somerset East, by streams at 600 m. alt., Mch. 1866, *Bolus* 300; British Caffraria, *Cooper* 37; Bazeia, Kaffraria, "a weed in cultivated lands, 600-750 m. alt." *Baur* 339.

Vernacular Names: Horseweed, Canadian Flea-bane.

Native of N. America where, also, it is described as a "common weed"; now naturalized widely through the Old World. An early introduction into S. Africa, having been collected in the Eastern Province and Natal prior to 1865 by Burke and others.

Sowerby states that the name Fleabane was given to this plant because of "its reputed power, when burned, of destroying fleas. According to M. Losanne, in a paper read to the Agricultural Society of Turin, the bark of this plant, after having undergone the process of soaking, may be made into excellent paper."

There has been a good deal of confusion in herbaria between the Asiatic *E. linifolius*, Willd. and the North American *E. canadensis*, L., as indicated by names and notes on herbarium sheets from Australia, etc. In some cases the specimens of *E. linifolius* have been equally divided between the covers of *E. canadensis*, L., and *Conyza ambigua*, DC. Tenore also appears (Syll. Fl. Neap.) to have misunderstood the species, calling the Mediterranean plant by the name Linnaeus applied to the N. American species. The illustration of *E. canadensis* in Bentham and Hooker's *Handbook to the British Flora* is misleading as is also that in Britton & Brown's *Illustrated Flora of N. America & Canada*.

Both plants are commonly met with in S. Africa, often growing together as weeds of fallow or badly cultivated lands. Of the two, *E. linifolius* is the most plentiful. They are readily distinguishable, when associated, *E. canadensis* being usually taller and greener, with a more distinctly paniculate inflorescence, than *E. linifolius*. The following synopsis indicates the points of difference:—

Branches long, corymbose, often much exceeding the main stem, and flowering after the heads which terminate the latter have shed their fruit; heads fully 3 lines high (*i.e.*, larger than in *E. canadensis*); leaves grey-green, not ciliate, the lower distantly and incisely toothed or laciniate; involucre pubescent; pappus usually white (in herbarium specimens sometimes pinkish, perhaps from the effect of poison?) - - - - - - - - 1. *E. linifolius*.

Branches short, paniculate (not corymbose), flowering at the same time as the main stem; heads only 1½–2 lines high; leaves yellowish-green (not grey-green), the lower sparingly toothed to quite entire, ciliate with short mostly incurved hairs arising from small tubercles; involucre almost glabrous; pappus usually tawny - - - - - - - 2. *E. canadensis.*

E. linifolius has at various times been placed in the genus *Conyza*, with which it and its allies of the Section *Coenotus*, Nutt. (Genus *Leptilon*, Raf.) form a connecting link, by their very short and inconspicuous rays. It was removed from *Conyza* by Bentham & Hooker (Gen. Pl. ii. p. 283).

XXXV.—MISCELLANEOUS NOTES.

Capt. F. Burnett, M.C., B.A., has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a Divisional Agricultural Officer in the Department of Agriculture, Ceylon.

Mr. D. Prain, Agriculturist, Nyasaland (*K.B.*, 1919, 446) has been appointed by the Secretary of State for the Colonies, Senior District Agricultural Officer in the Tanganyika Territory.

Mr. A. E. Haarer has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a District Agricultural Officer in the Tanganyika Territory.

Mr. H. A. Dade has been appointed by the Secretary of State for the Colonies, Assistant Mycologist in the Department of Agriculture, Gold Coast.

Mr. J. A. Robotham has been appointed by the Secretary of State for the Colonies, Assistant Agricultural Superintendent, St. Kitts-Nevis.

Botanical Exploration in French West Africa.*—Under the subjoined title Dr. A. Chevalier has published a complete list of botanical specimens gathered during his journeys in the Western Sudan from 1898 to 1912. The chief object of these expeditions was the investigation of the agricultural and forest resources of French West Africa, and for this purpose Dr. Chevalier travelled upwards of 50,000 kilometres, and collected about 10,700 botanical specimens.

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* Aug. Chevalier. Exploration botanique de l'Afrique occidentale française, Tome i., Énumération des Plantes Récoltées, pp. 795, and a vegetation map. (Paris, 1920, 60 fr.)

The enumeration of these, arranged after Bentham & Hooker's Genera Plantarum, occupies a volume of 795 pages. Particulars of habitat, date of collection, vernacular names and short economic notes are given under each species, many of which have been determined at Kew, and are enumerated in the pages of the later parts of the Flora of Tropical Africa. Dr. Chevalier has also had the assistance of several specialists in certain families, and the names of these are mentioned. At the end of the enumeration there is an index to the families, and in addition a large and very interesting map of Upper Guinea, showing the routes followed by the author, the character of the vegetation, and the geographical range of the more important economic plants, which include among others, the rubber producing species of *Apocynaceae*, the Oil and other palms, the Shea-utter tree, and Gum-arabic.

Dr. Chevalier is to be warmly congratulated on this contribution to our knowledge of the vegetation of "Upper Guinea," which, together with the numerous collections we already possess from our own West African Colonies, would provide abundant material for a critical and more comprehensive study of the whole of this part of Tropical Africa. J. H.

The Book of the Mango.*—This work contains chapters on the History, Propagation, Planting, Culture, Marketing, Transport of Trees, Scions and Seeds, Renovation of neglected plantations, Flowering and Pollination, Pests and Diseases, Uses and Canning and Classification of the Mango. In the earlier chapters, especially on history and propagation, Woodrow, Firminger, Watt and Maries in India, Wester (Phillipines), Popenoe (Cuba), Collins (Porto Rico), Macmillan (Ceylon), Higgins (Hawaii), and other well-known writers on the subject have been quoted; but the greater part of the work is, as stated in the preface, the results of original observations and experiments made since 1908 in the Ganeshkhind Botanical Gardens, Kirkee, and in various parts of the Bombay Presidency. This Presidency, from its more favourable situation, seems to have taken a prominent part in popularising the fruit in the markets of this country. Fruits have come into Covent Garden from India and Jamaica at odd times, and only recently, in the "Times Weekly" of May 20th last, an examination at Covent Garden Market is illustrated of a consignment of "Alphonse" Mangoes, which had just reached London from Bombay (by the use of special packing cases) in good condition. Experiments have been made in sending fruits from the Ganeshkhind Gardens to Marseilles, Trieste and London by Mail Steamer (not in cold storage), and the authors express the opinion that, unless fruit can be sent in large quantity and in cold storage, there is no likelihood of developing an overseas trade; they were, however, more hopeful that a trade in canned mangoes may be developed, and apparatus

* By W. Burns, D.Sc. and S.H. Prayag, M.Ag., pp. 1–98, illustrated; (Govt. Central Press; Bombay, 1921). Price Rs. 3–5–0.

has been fitted up at the gardens since 1913 for the purpose of experiment, special mention being made of experiments with the variety "Alphonse," also included with other varieties as having been found to keep well as a fresh fruit.

Woodrow, in his book on the Mango (1904), describes 80 famous mangoes; the present work gives outline figures and descriptions of 89 varieties. J. H. H.

The Silviculture of Indian Trees.*—This comprehensive work comes at a very appropriate moment, for a special effort is being made to interest importers and manufacturers in Indian woods, and such a book cannot fail to impress people with the wealth of trees growing in the forests of India. Professor Troup's long connection with the Indian Forest Service at the Forest Research Institute at Dehra Dun and elsewhere, placed him in a peculiarly advantageous position for studying the subject, whilst his undoubted ability for critical observation and description enabled him to make the most of his opportunities, and he has produced a book which will, without doubt, become classical in its application, although the author regards it simply as a foundation for further effort in the creation of a greater work on Forest Research by future workers. There are three volumes consisting of 1195 pages of descriptive letterpress, in addition to 58 introductory pages and 490 pages of black and white and coloured illustrations. The book is arranged botanically, the first volume carrying the student from *Dilleniaceae* to *Leguminosae* (*Papilionaceae*). Volume II advances the work to *Verbenaceae*, whilst the third volume commences with *Lauraceae* and concludes with *Coniferae* and a good index. In the introduction the author directs attention to the very complex nature of Indian silviculture, its limitations and possibilities. The immense area of country under the direction of the Indian Forest Service embraces all kinds of climatic conditions, from hot arid plains with a negligible rainfall to regions with a precipitation of 460 inches per annum; and from land sweltering under tropical heat and cloudless skies to alpine valleys shrouded in almost perpetual mist, and altitudes where the temperature is too low for the proper development of cold temperate trees. As the soil conditions are quite as variable, it might naturally be expected that the silva of the country would be rich in species, and such is the case. The timber of some of these species, though of local use, has little or no general application; and the author appears, in the first place, to have been undecided as to the advisability of including them amongst more important trees. Fortunately, he decided in favour of the wider view, and the result is a complete work on the forest trees of India, including a few important exotics, notably species of *Eucalyptus*. In dealing with the less important trees, Prof. Troup gives a

* The Silviculture of Indian Trees, by R. S. Troup, M.A., C.I.E. 3 vols. Published under the authority of His Majesty's Secretary of State for India in Council. Oxford, at the Clarendon Press.

botanical description, the general distribution, and the chief cultural requirements of the species, the whole in some cases being confined to a few lines or at most to half a page. But where important species are concerned, he goes very deeply into detail, in botanical description, distribution, cultural requirements, rate of growth, and other matters. The description of "Sal" (*Shorea robusta*), an important hardwood, for instance, occupies some 70 pages, whilst that of the "Deodar" (*Cedrus Deodara*), the most important coniferous tree of the Western Himalaya, covers 36 pages. In each case the description is full of detail, botanical and silvicultural. The excellent series of coloured drawings of seeds, germinating seedlings, and young plants are of the greatest interest. The other drawings, black and white and coloured, and also the photographs, are excellent in every way. W. D.

Forest Trees and Shrubs of Hungary.—This fine book* on the distribution of the trees and shrubs in Hungary was published just before the outbreak of the war, and has only just reached us through H.M. Stationery Office. It deals with the woody vegetation of the territory included in the pre-war Hungarian Kingdom, which comprises the Carpathians, the Alps of Croatia, Carinthia, and Hungary, Slavonia, the Transylvanian and Siebenburgen Mountains, and the great Hungarian plain. Five coloured maps show the physical geography of the region and the distribution of the more important species, comprising spruce, silver fir, yew, Austrian, Cembran, and common pines, larch, beech, green alder, three species of oak, chestnut, hornbeam, hop-hornbeam, lime, maple, ash, holly and lilac. The plates in the first volume are excellent reproductions of photographs of forest scenes, amongst which may be signalled out those of Austrian pine on limestone precipices, larch at a high altitude in the Tatra, and oak in Slavonia. The text is perhaps the most detailed description yet published of any territory, as regards the exact vertical and horizontal limits of the species which compose the forests. Much information is given on plant geography generally, and special chapters are devoted to the afforestation schemes that are being carried out in three remarkable districts: in the sandy parts of the Hungarian plain; in the desert, comparable to a small Sahara, of Deliblat, north of the Danube to the east of Belgrade; and in the Karst, the dreary limestone plateau which extends along the Adriatic coast from Fiume to Gorizia. The book should be procured by all lovers of trees and students of forestry. Its scientific value will also be appreciated by ecologists. A. HENRY.

* L. Fekete und T. Blattny, Die Verbreitung der forstlichwichtigen Bäume und Sträucher im Ungarischen Staate. Selmecbànya: Aug. Joerges Witwe Sohn, Vol. i, 845 pages, 13 plates, 1914. Vol. ii, 150 pages, 5 coloured maps, 1913.

The Coco Nut.*—The first edition of this work appeared in 1914 [*see K. B.* 1914, p. 396], the author (now retired) being Professor of Physiology and Dean of the College of Agriculture, University of the Philippines. In the Foreword to the second edition, published this year, the author rightly directs attention to the fillip given to the industry during the Great War, and to the importance of the coconut, more particularly as a source of edible oil. During this period the cultivation of the tree has greatly extended; improved methods have been adopted for the preparation of copra for export, and the general standard of the industry has, in many other directions, been permanently raised. The matter is grouped into six chapters in the following order: Physiology of the Coconut, Climate and Soil, Diseases and Pests, Selection and Treatment of Seed, Field Culture, Coconut Products. This book appears to have been most carefully written, and is full of interest, and can most certainly be recommended to the notice of the tropical planter and to others connected with the industry. The illustrations are good, and there is an ample index. It may be noted that the price of the first edition was 10*s.*, whereas that of the present edition has been raised to double that amount. J. M. H.

* The Coconut, by Edward Bingham Copeland. Second Edition, revised, pp. xvi, 225 with 23 illustrations. Macmillan & Co., Limited, St. Martin's Street, London, 1921.

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